Android and Portable Camera-Based Assistive Text Reading from Images and Messages

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Abstract:

In nowadays, we must make use of various high-tech tools and equipments to get our jobs done and make our life comfortable. In this presented paper we introduced an advanced portable camera based text or message reading system specially for physically challenged. The portable system which captures the images and text written which are placed in front of the Pi camera can be read out or announced out using speakers/head phones interfaced to the Raspberry Pi processor. The Raspberry Pi processor takes the responsibility for authentication of the image which is fed as input to it and also alerts the blind person through voice messages using speakers or head phones. The proposed system aims at designing an innovative system which is very helpful for the physically challenged like blind persons to recognize the text from captured images and also from messages reading which are texted from android mobile and read out using speakers or head phones connected to raspberry pi processor.

Keywords:

ARM-11Raspberry Pi Processor, Pi camera, speakers, Bluetooth module.

1. Introduction:

The survey which was conducted in 2009 by World Health Organization on disability, there are 269 million visually impaired and 45 million blind people worldwide. Ageing populations and lifestyle changes means that chronic blinding conditions such as diabetic retinopathy are projected to rise exponentially. Without effective, major intervention, the number of blind people worldwide has been projected to increase to 76 million by 2020 if current trends continue. There are many traditional and advanced navigational aids are available for visually impaired and blind people. Reading devices read text out loud for visually impaired individuals. A variety of reading machines exist, from portable to desktop solutions and computer-based to standalone solutions. ATR has an option to fit a blind user's needs.

Recent assistive systems use digital video cameras as vision sensor along with other multiple sensors. These systems are quite bulky and involves physical interface with the subject. Captured images are re-sized, processed further and converted to speech, audio beeps, musical sound or vibrations. In such systems frequency of sound shares some relationship with the orientation of pixels. Some advanced systems use Global Positioning System (GPS) integration with the main system. GPS receiver is useful for understanding the current location of the subject and nearby landmarks. We proposed a new technology using Android mobile and develop a messages reading system using Bluetooth wireless communication interfaced with speakers or head phones connected to raspberry pi processor. Android is a multi-process system, in which each application (and parts of the system) runs in its own process. Most security between applications and the system is enforced at the process level through standard Linux facilities, such as user and group IDs that are assigned to applications. Additional finer-grained security features are provided through a "permission" mechanism that enforces restrictions on the specific operations that a particular process can perform, and per-URI permissions for granting ad-hoc access to specific pieces of data. The officially supported programming language on the Android platform is Java. We can also use XML as the descriptor file as well as the user interface of an application is based on that. As the Linux kernel of the Android platform is based upon an ARM processor architecture it would also be possible to write code in C or other languages and compile it to ARM native code.

II. LITERATURE SURVEY:

In [1] Discusses an intelligent system. Physically invisible people experience difficulty and inconvenience using computers through a keyboard and mouse. The purpose of this system is to provide a way the blind people population can easily control many functions of a computer via speech.

When blind people speak, the audio voice input is sent to the speech Browser .solenoid plated are very useful to convert this web search into braille. Many applications running on this purpose but not all the applications able to fulfil over it and this system has better aspects in future for normal people as well as blind people. This application is firstly embedded on raspberry pi and Qt creator is the software which is being useful to interface this GUI with the hardware connected to Pi. [2] Presents a Navigation System for blind people to navigate safely and quickly, in the system obstacle detection and recognition is done through ultrasonic sensors and USB camera. The proposed system detects the obstacles up to 300 cm via ultrasonic sensors and sends feedback in the form of beep sound via earphone to inform the person about the obstacle. USB webcam is connected with Raspberry Pi Embedded board which captures the image of the obstacle, which is used for finding the properties of the obstacle (Human Being). Human presence is identified with the help of human face detection algorithm written in Open CV. The constraints coming while running the algorithm on Embedded System are limited memory and processing time and speed to achieve the real time image processing requirements. The algorithm is implemented in Open CV, which runs on Debian based Linux environment

III. IMPLEMENTATION:

The proposed portable system which captures the images and text written which are placed in front of the camera can be read out or announced out using speakers. These details were verified using Raspberry Pi processor for authentication and alerts visually impaired or blind person through voice messages using speakers or head phones.

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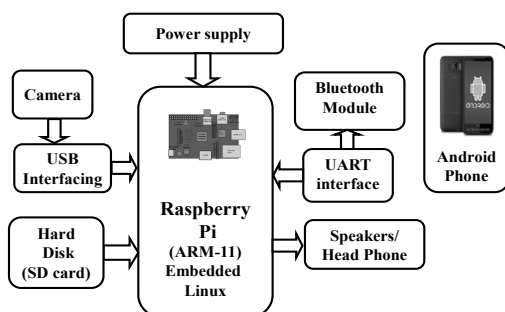

Figure:-1. Block diagram of proposed system

The objectives of the project are:
1.Product label reading from captured image
2.Usage of image authentication technology.
3.Reading out Text messages using Bluetooth wireless technology

4.Captured image text book reading
5.Voice announcements through speakers or head phones.

Usage of Text to Speech conversion technology from Images and messages

Figure- 2. Hardware implementation of the proposed system

IV. RELATED WORK:

The brief introduction of different modules used in this project is discussed below:

a. Raspberry Pi processor:

In the Proposed Real time system of License plate detection for car parking we used the Raspberry Pi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation. The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. It does not include a built-in hard disk or solid-state drive, but uses an SD card for booting and long-term storage.

Afore mentioned identification or recognition process using raspberry pi processor will change slightly between different products and systems. These Standard systems are comprised of a PI camera for the automated information resource of the portable system which captures the images and text written which are placed in front of the camera can be read out or announced out using speakers. These details were verified using Raspberry Pi processor for authentication. The Raspberry Pi processor system alerts the blind person through voice messages using speakers or head phones. To perform this task, Raspberry Pi processor is programmed using embedded 'Linux'.

Linux is a Unix-like computer operating system assembled under the model of free and open source software development and distribution. The defining component of Linux is the Linux kernel, an operating system.

The Linux Standard Base (LSB) is a joint project by several Linux distributions and is based onthe POSIX specification, the Single UNIX Specification, and several other open standards, but extends them in certain areas.

Figure.Raspberry Pi programming screen shot using Linux

b. Raspberry Pi camera:

The Raspberry Pi camera module can be used to take high definition video, as well as stills photographs. It's easy to use for beginners, but has plenty to offer advanced users and are used by online people using it for time-lapse, slow motion and other video cleverness. The module has a five megapixel fixed-focus camera that supports 1080p30, 720p60 and VGA90 video modes, as well as stills capture. It attaches with a 15cm ribbon cable to the CSI port onto the Raspberry Pi Processor.
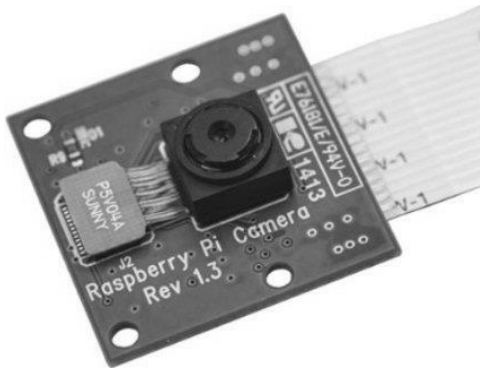

Figure. Raspberry Pi camera

c. Bluetooth Module:

Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz) from fixed and mobile devices, and building personal area networks (PANs). Invented by telecom vendorEricsson in 1994 it was originally conceived as a wireless alternative to RS-232 data cables. It can connect several devices, overcoming problems of synchronization.

The module's host and slave, the host and slave pairing communication from the machine and from the machine or between the host and the host cannot communicate, communication function and computers, mobile phones and other Bluetooth pairing purchase default slave , requires that the host needs to be indicated.

Figure. Bluetooth Receiver module

d. Head Phones/Speakers:

The output of the proposed system is provided with the announcement using head phones or speakers. The Raspberry pi has two audio output modes: HDMI and head phone jack. In the proposed system we are using head phone jack of 3.5mm Audio Output Jack.

Figure.Image of Audio output jack interfacing with Raspberry Pi

IV CONCLUSION:

The existing model presents an Integrating feature of all the hardware components which has been used and developed in it with Arm-11 Raspberry pi processor. The Presence of each and every module has been reasoned out and placed very carefully. Hence the contributing to the best working unit for an automatic license plate recognition system has been designed perfectly.

Secondly, using highly advanced IC's like ARM1176JZF-S 700 MHz processor, Linux operating system technology with the help of growing technology, the project has been successfully implemented with a unique idea. Thus the project has been successfully designed and tested. The existed paper presents "Android and Portable Camera-Based Assistive Text Reading from Images and Messages" which was designed such that the system captures the image of any hand held object (product) is placed in front of the Raspberry Pi camera. The captured image or text details are fed as input to the Raspberry Pi processor.The Processor takes responsibility to check the details and announces using voice messages using speakers or head phones for the blind person.

The system also reads the text message sent through android mobile using Bluetooth wireless communication. The messages are announced out through speakers or headphones to the blind person. To perform this task, Raspberry Pi processor is programmed using embedded 'Linux'. This project can be extended by adding sensors like Fire sensor, obstacle sensor, for providing alerts in case of emergency times like during fire accidents, or any obstacle detections with voice alerts to blind. The project can be extended using high efficiency GPS receiver which can give the location based announcements for visually impaired.

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